

## Contents

<b>00 - Technical data</b> .....	<b>1</b>
<b>1 Technical data</b> .....	<b>1</b>
1.1 Technical data .....	1
1.2 Engine number .....	1
1.3 Engine data .....	1
<b>10 - Removing and installing engine</b> .....	<b>3</b>
<b>1 Removing and installing engine</b> .....	<b>3</b>
1.1 Removing and installing engine .....	3
1.2 Removing .....	4
1.3 Attaching engine to repair stand .....	12
1.4 Installing .....	13
1.5 Tightening torques .....	15
<b>13 - Crankshaft group</b> .....	<b>17</b>
<b>1 Dismantling and assembling engine</b> .....	<b>17</b>
1.1 Dismantling and assembling engine .....	17
1.2 Ribbed belt drive for alternator; V-belt drive for coolant pump and vane pump .....	17
1.3 Removing and installing V-belt .....	24
1.4 Tensioning V-belts .....	24
1.5 Removing and installing ribbed belt .....	25
1.6 Toothed belt drive .....	27
1.7 Removing and installing toothed belt .....	32
1.8 Checking semi automatic toothed belt tensioning roller .....	37
1.9 Positioning crankshaft to TDC with engine removed .....	38
<b>2 Removing and installing sealing flanges and flywheel/drive plate</b> .....	<b>40</b>
2.1 Removing and installing sealing flanges and flywheel/drive plate .....	40
2.2 Replacing crankshaft oil seal on pulley end .....	45
2.3 Removing and installing flywheel/drive plate .....	48
<b>3 Removing and installing crankshaft</b> .....	<b>51</b>
3.1 Removing and installing crankshaft .....	51
3.2 Removing and installing needle bearing in crankshaft .....	56
3.3 Crankshaft dimensions .....	57
<b>4 Dismantling and assembling pistons and conrods</b> .....	<b>58</b>
4.1 Dismantling and assembling pistons and conrods .....	58
4.2 Checking piston projection at TDC .....	66
4.3 Piston and cylinder dimensions .....	68
<b>15 - Cylinder head, Valve gear</b> .....	<b>69</b>
<b>1 Removing and installing cylinder head</b> .....	<b>69</b>
1.1 Removing and installing cylinder head .....	69
1.2 Removing and installing cylinder head cover .....	74
1.3 Removing and installing intake pipe .....	76
1.4 Removing cylinder head .....	78
1.5 Installing cylinder head .....	84
1.6 Checking compression .....	87
<b>2 Servicing valve gear</b> .....	<b>89</b>
2.1 Servicing valve gear .....	89
2.2 Checking camshaft axial play .....	96
2.3 Removing and installing camshaft .....	96
2.4 Checking hydraulic bucket tappets .....	100
2.5 Replacing valve stem seals .....	101
2.6 Reworking valve seats .....	104



2.7	Checking valve guides . . . . .	106
2.8	Checking valves . . . . .	107
<b>17</b>	<b>- Lubrication . . . . .</b>	<b>108</b>
<b>1</b>	<b>Removing and installing parts of the lubrication system . . . . .</b>	<b>108</b>
1.1	Removing and installing parts of the lubrication system . . . . .	108
1.2	Part I . . . . .	109
1.3	Part II . . . . .	113
1.4	Removing and installing oil pan . . . . .	116
1.5	Removing and installing oil pump . . . . .	119
1.6	Checking oil pressure and oil pressure switch . . . . .	120
1.7	Engine oil . . . . .	122
1.8	Checking oil level . . . . .	122
<b>19</b>	<b>- Cooling system . . . . .</b>	<b>123</b>
<b>1</b>	<b>Removing and installing parts of the cooling system . . . . .</b>	<b>123</b>
1.1	Removing and installing parts of the cooling system . . . . .	123
1.2	Parts of cooling system . . . . .	124
1.3	Draining and filling cooling system . . . . .	126
1.4	Removing and installing coolant pump . . . . .	129
1.5	Removing, installing and checking coolant thermostat . . . . .	131
1.6	Removing and installing radiator . . . . .	133
1.7	Checking cooling system for leaks . . . . .	135
<b>21</b>	<b>- Charging . . . . .</b>	<b>137</b>
<b>1</b>	<b>Checking charge air system with turbocharger . . . . .</b>	<b>137</b>
1.1	Checking charge air system with turbocharger . . . . .	137
1.2	Test requirements for checking exhaust turbocharging . . . . .	138
1.3	Effects of leaks in intake or exhaust system . . . . .	138
1.4	Checking boost pressure . . . . .	139
1.5	Checking boost pressure control valve linkage and vacuum unit . . . . .	143
1.6	Diagram of connections for boost pressure control system . . . . .	145
1.7	Check solenoid valve for boost pressure limitation -N75 . . . . .	146
1.8	Checking intake manifold pressure sensor . . . . .	149
<b>2</b>	<b>Servicing charge air system with turbocharger . . . . .</b>	<b>151</b>
2.1	Servicing charge air system with turbocharger . . . . .	151
2.2	Rules for cleanliness . . . . .	151
2.3	Removing and installing turbocharger - overview . . . . .	152
2.4	Removing and installing vacuum unit for boost pressure control valve . . . . .	157
2.5	Removing and installing turbocharger . . . . .	158
2.6	Removing and installing parts of charge air cooling system . . . . .	161
2.7	Removing and installing charge air cooler (intercooler) . . . . .	164
<b>26</b>	<b>- Exhaust system . . . . .</b>	<b>167</b>
<b>1</b>	<b>Removing and installing parts of exhaust system . . . . .</b>	<b>167</b>
1.1	Removing and installing parts of exhaust system . . . . .	167
1.2	Removing and installing exhaust manifold . . . . .	170
1.3	Removing and installing front exhaust pipe with catalytic converter . . . . .	171
1.4	Stress-free alignment of exhaust system . . . . .	172
1.5	Checking exhaust system for leaks . . . . .	172
<b>2</b>	<b>Exhaust gas recirculation system . . . . .</b>	<b>173</b>
2.1	Exhaust gas recirculation system . . . . .	173
2.2	Removing and installing exhaust gas recirculation components . . . . .	173
2.3	Diagram of vacuum hose connections . . . . .	175
2.4	Checking mechanical EGR valve . . . . .	176
2.5	Checking EGR . . . . .	176
2.6	Checking EGR valve -N18 . . . . .	179